(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開2003－37097
（P2003－37097A）
(43)公開日　平成15年２月７日(2003.2.7)

(51)Int.Cl.'	識別記号	FI	テーマコード'(参考)
Ｈ０１Ｌ　21/304	６４８	Ｈ０１Ｌ　21/304	６４８Ｇ　２Ｈ０８８
	６４３		６４３Ａ　２Ｈ０９０
Ｇ０２Ｆ　1/13	１０１	Ｇ０２Ｆ　1/13	１０１　５Ｆ０４３
1/1333	５００	1/1333	５００
Ｈ０１Ｌ　21/306		Ｈ０１Ｌ　21/306	Ｋ

審査請求　未請求　請求項の数７　ＯＬ　（全 10 頁）

(21)出願番号　特願2001－222436(P2001－222436)

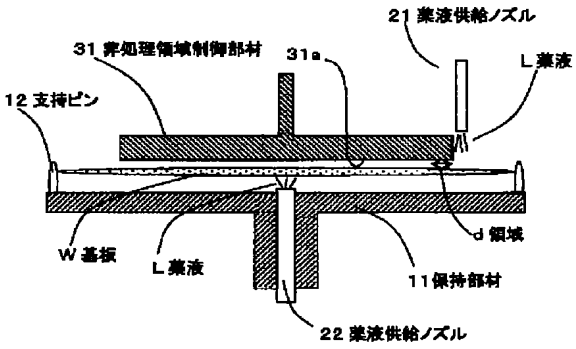
(22)出願日　平成13年７月24日(2001.7.24)

(71)出願人　000002185
ソニー株式会社
東京都品川区北品川６丁目７番35号
(72)発明者　逢坂　勉
東京都品川区北品川６丁目７番35号　ソニー株式会社内
(74)代理人　100086298
弁理士　船橋　國則

Ｆターム(参考)　2H088 FA21 FA25 FA30 HA01 MA20
2H090 JB02 JC09 JC19
5F043 AA31 BB22 DD13 DD21 EE07
EE08 EE15 EE35 GG10

(54)【発明の名称】　表面処理装置及び表面処理方法

(57)【要約】
【課題】　基板の表面における回転非対称な領域や任意の形状の領域を処理するための表面処理装置及び表面処理方法を提供する。
【解決手段】　基板Ｗの表面を薬液Ｌにより処理するための表面処理装置であって、基板Ｗを保持可能な保持部材１１と、前記基板Ｗの表面の非処理領域Ｂにおける薬液の浸入を抑えるための非処理領域制御部材３１とからなり、保持部材１１に基板Ｗが保持された状態で、非処理領域制御部材３１が非処理領域Ｂの少なくとも周縁部Ｄに対向して配置されることを特徴とする表面処理装置及びこの装置を用いた表面処理方法である。



1

【特許請求の範囲】

【請求項１】　基板の表面を薬液により処理するための表面処理装置であって、

基板を保持可能な保持部材と、

前記基板の表面の非処理領域における薬液の浸入を抑えるための非処理領域制御部材とからなり、

前記保持部材に前記基板が保持された状態において、前記非処理領域制御部材が前記非処理領域の少なくとも周縁部に対向して配置されることを特徴とする表面処理装置。

【請求項２】　請求項１記載の表面処理装置において、前記非処理領域制御部材の前記基板に対向する面は、前記薬液をはじく材質で形成されていることを特徴とする表面処理装置。

【請求項３】　請求項１記載の表面処理装置において、前記非処理領域制御部材には、前記基板に対向する面側に貫通したガス供給口が形成されていることを特徴とする表面処理装置。

【請求項４】　請求項１記載の表面処理装置において、前記保持部材が回転可能であり、

前記保持部材に同期して、前記非処理領域制御部材が同方向、同回転数で回転可能であることを特徴とする表面処理装置。

【請求項５】　請求項１記載の表面処理装置において、前記保持部材に前記基板が保持された状態で、前記基板の表面の処理領域全体を覆うように所定間隔で配置される、薬液供給部材を備えていることを特徴とする表面処理装置。

【請求項６】　基板の表面を薬液により処理するための表面処理方法において、前記基板の表面の非処理領域における前記薬液の浸入を抑えるための表面処理方法であって、

前記基板の表面における非処理領域の少なくとも周縁部に、非処理領域制御部材を対向配置した状態で、

前記基板の表面の処理領域に前記薬液を供給して処理を行うことを特徴とする表面処理方法。

【請求項７】　請求項６記載の表面処理方法において、前記非処理領域制御部材と前記基板との間隙にガスを供給した状態で、

前記基板の表面の処理領域に前記薬液を供給して処理を行うことを特徴とする表面処理方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は基板の表面処理装置及び表面処理方法に関し、特には半導体装置や液晶表示装置等の製造工程において基板表面の湿式洗浄や湿式エッチングを行う際の表面処理装置及びこの装置を用いた表面処理方法に関する。

【０００２】

【従来の技術】半導体装置の製造工程において、例え

2

ば、成膜、リソグラフィー、ドライエッチング等、複数の工程を経た後の基板表面の周縁部は、半導体基板上に成膜された絶縁膜や導電膜等の加工膜の端部がめくり上がっていたり、これらの加工膜の一部が離脱しかけていたりと非常に不安定な状態にあり、発塵源の一因となりやすい。そこで、このような発塵源を除去するために、基板の表面の周縁部における不要な加工膜を湿式エッチング除去する等の基板の表面処理が行われている。

【０００３】このような基板の表面処理は、多くの場合、回転式の枚葉処理装置を用いて行われる。具体的には、枚葉処理装置の保持部材に基板を保持し、水平に保った状態で基板を保持した保持部材を回転させて、基板表面の周縁部（処理領域）の上方に配置した薬液供給ノズル等から、処理領域の回転中心により近い部分に、一定の流量で連続して薬液を供給する。そして、遠心力によって薬液を基板の外周方向に流動させながら、基板表面の処理を行い、周縁部の加工膜のエッチング除去を行っていた。

【０００４】

【発明が解決しようとする課題】しかし、上述したような従来の基板の表面処理方法では、遠心力によって薬液の供給を制御するため、供給量が多いと基板の周縁部の内側にある非処理領域にも薬液が浸入して、非処理領域の加工膜まで処理されてしまうという問題があった。また、この方法では回転中心に対して対称な領域しか処理することができないという問題があった。例えば、図８に示したように半導体基板Ｓ表面に回転非対称なチップ領域Ｈを有した場合、チップの収率を確保するためにはチップ領域Ｈの外周円よりも外側部分Ｉの加工膜を処理するが、チップ領域Ｈの外周円よりも内側部分Ｊに加工膜の不安定な状態にある部分が残存している場合は、この不安定な部分を十分に除去することができず、発塵源の一因となりチップの電気的信頼性を低下させる可能性があった。また、加工膜の不安定部分の除去に重点を置くと、基板の周縁部の処理幅を広げることになるため、チップ領域Ｈにも処理が及ぶことになり、半導体基板Ｓにおけるチップの収率が低下するという問題があった。

【０００５】このような問題を解決するために、基板の表面の非処理領域に薬液を浸入させることなく、回転非対称な領域や任意の形状の領域における不要な加工膜をエッチング除去してチップの収率を確保することが可能な表面処理方法が必要とされていた。

【０００６】そこで、任意の形状の領域の加工膜を除去するために、基板の表面の処理領域に対して間隙を形成する間隙形成部材を設け、毛細管現象を利用して処理液を供給する方法が報告されている（特許番号第２９０２５４８号）。しかし、この方法では、基板表面の非処理領域における薬液の浸入に対する制御性が十分ではなかった。

【０００７】したがって、非処理領域に薬液を浸入させ

ることなく、基板の表面における任意の形状の処理領域に対して、表面処理を行うことが可能な表面処理装置及び表面処理方法の提供が望まれていた。

【０００８】

【課題を解決するための手段】本発明はこのような課題を解決するために成されたものであり、基板の表面における非処理領域に薬液を浸入させることなく、回転非対称な領域や任意の形状の領域を処理するための表面処理装置及び表面処理方法に関する。

【０００９】本発明における請求項１記載の表面処理装置は、基板を保持可能な保持部材と、基板の表面の非処理領域における薬液の浸入を抑えるための非処理領域制御部材とからなり、保持部材に基板が保持された状態において、非処理領域制御部材が非処理領域の少なくとも周縁部に対向して配置されることを特徴としている。上記構成の表面処理装置によれば、非処理領域制御部材が非処理領域の少なくとも周縁部に対向して配置されていることにより、非処理領域における薬液の浸入を防ぐことが可能である。

【００１０】また、上述した表面処理装置における好ましい態様としては、非処理領域制御部材の基板に対向する面が、薬液をはじく材質で形成されていることを特徴とする。このような表面処理装置によれば、基板の表面における非処理領域の少なくとも周縁部に対向して、非処理領域制御部材の薬液をはじく材料で形成された面が配置される。このため、非処理領域制御部材の基板に対向する面と基板との間隔を、薬液と非処理領域制御部材の面形成材料により予め設定された、薬液が浸入しないような間隔に設定することにより、薬液がはじかれて、基板の表面の非処理領域における薬液の浸入を防ぐことができる。したがって、非処理領域制御部材を基板の非処理領域に接触させることなく、非処理領域への薬液の浸入を制御性よく防ぐことが可能である。

【００１１】また、本発明の表面処理装置におけるもう１つの好ましい態様は、非処理領域制御部材の基板に対向する面側に貫通したガス供給口が形成されていることである。このような表面処理装置によれば、非処理領域制御部材にガス供給口が形成されており、保持部材に保持された基板とこれに対して所定間隔で配置される非処理領域制御部材との間隙にガスを供給しながら、基板の表面処理を行うことが可能である。このため、基板と非処理領域制御部材との間隔においては、非処理領域から処理領域方向にガスが流動することから、非処理領域制御部材を基板の非処理領域に接触させることなく、非処理領域への薬液の浸入を制御性よく防ぐことが可能である。

【００１２】また、本発明の請求項６記載の表面処理方法は、基板の表面の非処理領域における薬液の浸入を抑えるための表面処理方法であって、前記基板の表面における非処理領域の少なくとも周縁部に、非処理領域制御

部材を対向配置した状態で、前記基板の表面の処理領域に前記薬液を供給して処理を行うことを特徴としている。

【００１３】このような表面処理方法では、基板の表面における非処理領域の少なくとも周縁部に、非処理領域制御部材を対向配置した状態で処理を行うことから、非処理領域における薬液の浸入を防ぎ、処理領域のみを薬液により処理することができるため、例えば、回転非対称な領域のような任意の形状の領域における薬液による処理を確実に行うことが可能となる。

【００１４】

【発明の実施の形態】以下、本発明の表面処理装置及び表面処理方法の実施形態を詳細に説明する。本実施形態で説明する表面処理装置及び表面処理方法は、半導体ウエハ等の基板の表面に対して、湿式洗浄や湿式エッチングを行う場合のように、これらの基板の表面に薬液を供給して処理を行うための表面処理装置及びこの装置を用いた表面処理方法である。

【００１５】（第１実施形態）本実施形態では半導体基板に塗付されたSiO_2膜の不要部分を除去する場合の表面処理を例にとり、本発明の実施形態を説明する。図２に示したように表面処理の対象となる基板Ｗは、基板の中心部を含む十字型の回転非対称なチップ領域を有しており、基板Ｗの上面側にはSiO_2膜が全面塗付されている。

【００１６】ここで、基板Ｗの上面側は非処理領域Ｂと処理領域Ｃを有するものとする。非処理領域Ｂは、表面処理後のチップ領域上に確実にSiO_2膜が残されるようにするため、少なくともチップ領域（図示省略）を含む領域であり、ここではチップ領域の外周形状を一回り拡大した領域とする。一方、処理領域Ｃは基板Ｗ上面側の非処理領域Ｂ以外の部分であり、基板の周縁部と連続している回転非対称な領域である。本実施形態では処理領域ＣのSiO_2膜を処理（エッチング除去）するために用いられる表面処理装置及びこの装置を用いた表面処理方法について説明する。

【００１７】図１は第１実施形態の表面処理方法に用いる表面処理装置の断面図であり、基板Ｗについては図２におけるＡ－Ａ’断面を示すものとする。図１に示す表面処理装置は回転式の枚葉処理装置であり、基板Ｗを保持する保持部材１１と保持部材１１の上方に配置された薬液供給ノズル２１と、保持部材１１に保持された基板Ｗの上面側に対向して任意の間隔で配置される面３１ａを備えた非処理領域制御部材３１とを有している。

【００１８】保持部材１１は、基板Ｗのエッジを押え込んで基板Ｗを固定するための複数の支持ピン１２を備えたものであり、基板Ｗの処理面である上面側とその下面側とが保持部材１１と接触しないような状態で固定可能に構成されている。また、保持部材１１は保持した基板Ｗを水平に保った状態で回転可能なスピンチャックであ

る。

【００１９】薬液供給ノズル２１は、本実施形態では基板Ｗを回転させて処理を行うことから、基板Ｗ上に供給された薬液が遠心力によって基板Ｗの外周方向へ流動することを考慮に入れ、保持部材１１に保持された基板Ｗの処理領域Ｃの上方で、回転中心により近いところに配置される。尚、基板Ｗにおける上面側の処理領域Ｃとともに基板Ｗの下面側の処理も行うことを目的として、保持部材１１側にも薬液供給ノズル２２を配置してもよい。

【００２０】非処理領域制御部材３１の基板Ｗに対向する面３１ａは、基板Ｗの非処理領域Ｂと同一形状であり、この面３１ａは、基板Ｗ表面に対して所定間隔を保ちつつ、保持部材１１に保持された基板Ｗの非処理領域Ｂと外周形状を合致させて配置される。本実施形態では、非処理領域制御部材３１の面３１ａが非処理領域Ｂと同一形状であり、非処理領域Ｂ全体に対向して配置される場合を例にとったが、図２に示す基板Ｗにおける非処理領域Ｂの少なくとも周縁部Ｄに対向して配置される面を有していればよい。

【００２１】非処理領域制御部材３１の面３１ａは、例えば、SiO_2膜を処理する薬液Ｌをはじく材料で形成されるものとする。ここで、薬液Ｌをはじく材料とは、薬液Ｌを滴下した際、接触角が９０度より大きい材料であることとする。ここでは、薬液Ｌとしてフッ化水素酸水溶液（ＨＦａｑ．）を使用するため、非処理領域制御部材３１の面３１ａの形成材料として四フッ化エチレン重合体を使用することができるが、これに限定されるものではなく、四フッ化エチレン・パーフルオロアルコキシエチレン共重合体等、ＨＦａｑ．をはじく材料であれば構わない。

【００２２】また、非処理領域制御部材３１の面３１ａが薬液Ｌをはじく材質で形成されていればよいことから、面３１ａのみを薬液Ｌをはじく材質でコーティングしてもよく、また、面３１ａに薬液Ｌをはじくような処理を施してもよい。

【００２３】さらに非処理領域制御部材３１は、保持部材１１に同期して、同方向、同回転数で回転可能である。また、その回転軸は、同軸線上にあるものとする。

【００２４】また、本実施形態の表面処理装置は、例えば、保持部材１１に保持された基板Ｗと非処理領域制御部材３１の面３１ａとの間隔を測定する測定手段と、非処理領域制御部材３１を上下動させるための駆動手段と、測定手段で測定された間隔と予め設定された間隔とに基づいて、保持部材に保持された基板Ｗと非処理領域制御部材３１の面３１ａとが上記設定された間隔となるように、駆動手段による非処理領域制御部材３１の上下動を制御する制御手段とを有しているものとする。このような測定手段及び制御手段を設けたものであれば、非処理領域制御部材３１と基板Ｗとの間隔を自在に調整できる。

【００２５】次に、上記構成の表面処理装置を用いた本実施形態の表面処理方法を説明する。まず、基板Ｗを保持部材１１に保持し、非処理領域制御部材３１の面３１ａを、保持部材１１に保持された基板Ｗの非処理領域Ｂと外周形状が合致するように対向させて、非処理領域制御部材３１の面３１ａと基板Ｗとの間隔を薬液Ｌが浸入しないように予め設定された所定間隔で配置する。この際、例えば、非処理領域制御部材３１の面３１ａと基板Ｗとの間隔を測定手段で測定し、その測定した間隔と薬液Ｌが浸入しないように予め設定した間隔から、非処理領域制御部材３１を動かす距離を制御手段により算出する。その後、非処理領域制御部材３１ａを上下方向に可動させて、非処理領域制御部材３１の面３１ａと基板Ｗとの間隔を所定間隔に調整する。

【００２６】ここで、薬液Ｌが浸入しないように設定された、非処理領域制御部材３１の面３１ａと基板Ｗとの間隔は、薬液Ｌと面３１ａの形成材料によって実験的に決定されるものである。ただし、所定の間隔に設定しても、非処理領域Ｂにおける処理領域Ｃとの境界部分（例えば、図１に示す領域ｄ）に少量の薬液Ｌが浸入してしまう場合には、予め非処理領域制御部材３１の外周からの浸入距離を考慮して、非処理領域制御部材３１の外周形状を一回り大きくする等して調整する必要がある。

【００２７】次に、非処理領域制御部材３１と基板Ｗを保持した保持部材１１とを同方向、同回転数で回転し、薬液供給ノズル２１から処理領域Ｃにおいて回転中心により近いところに薬液Ｌを供給する。本実施形態では、基板を回転させて処理を行うことにより、薬液Ｌを基板Ｗ表面の外周方向へ流動させて、基板Ｗの周縁部と連続した処理領域Ｃの処理を行い、SiO_2膜を除去する。

【００２８】また、基板Ｗの下面側の不要なSiO_2膜の処理については、薬液供給ノズル２２からシャワー状に薬液Ｌを供給する等して、処理を行うことができる。上記処理の後、必要に応じて純水リンスや乾燥処理を行う。

【００２９】本実施形態の表面処理装置及びこれを用いた表面処理方法により、基板Ｗの非処理領域Ｂの少なくとも周縁部Ｄに、薬液Ｌをはじく材質で形成された非処理領域制御部材３１の面３１ａを、薬液Ｌが浸入しないように予め設定された所定間隔で対向配置した状態で、薬液Ｌによる基板Ｗの表面処理を行うことから、薬液Ｌの非処理領域Ｂへの浸入を防ぐことが可能である。しかも、非処理領域制御部材３１の面３１ａは基板Ｗの非処理領域Ｂと同一形状に成形されており、面３１ａと基板Ｗの非処理領域Ｂとを、所定の間隔を保ちつつ、外周形状を合致させて配置した状態で処理を行うことから、薬液Ｌの非処理領域Ｂへの浸入をより制御性良く防ぐことができる。

【００３０】また、前述したような構成の非処理領域制

御部材３１と基板Ｗとを所定間隔を保ちつつ、外周形状を合致させた状態で、同方向に同回転数で回転させながら処理を行うことにより、回転洗浄であっても、基板Ｗの表面の非処理領域における薬液Ｌの侵入を制御性よく防ぎ、回転非対称な処理領域Ｃを処理することが可能である。このため、加工膜の不要な部分のみを処理（エッチング除去）することができ、基板Ｗにおけるチップの収率も確保することができる。

【００３１】さらに、基板Ｗを回転させて処理を行うことにより、基板Ｗの処理領域Ｃに対して薬液Ｌを十分に供給して流動させながら効率よく処理を行うことができ、処理速度を高めることができる。

【００３２】本実施形態では非処理領域Ｂが回転非対称であるため、非処理領域制御部材３１を保持部材１１に同期させて回転する必要があるが、回転対称である場合は、非処理領域制御部材３１を回転しなくてもよく、また、保持部材１１の回転速度とは異なる回転速度で回転させてもよい。また、基板Ｗを回転させずに処理を行うことも可能であり、その場合には、保持部材１１はスピンチャックでなくてもよく、薬液供給ノズル２１はミスト状にするか、複数個配置する等して処理領域Ｃ全体に薬液Ｌが供給されるようにする。

【００３３】薬液Ｌについては本実施形態ではＨＦａｑ．を使用したが、SiO_2膜を処理可能な薬液であれば、ＨＦａｑ．に限定されるものではない。また、加工膜がSiO_2膜以外である場合には、その加工膜を処理可能な薬液Ｌを使用し、薬液Ｌの表面張力（接触角）により非処理領域制御部材３１の面３１ａの形成材料を決定する。

【００３４】また、本実施形態では、基板Ｗの処理領域が基板Ｗの周縁部である場合について説明した。この場合は非処理領域制御部材３１が基板Ｗの表面の非処理領域における少なくとも周縁部に配置されていればよいが、処理領域が基板の周縁部と連続していない場合、例えば、基板の中心部分であったり、基板Ｗの周縁部を含まずに、複数箇所に分かれて分布しているような場合には、非処理領域制御部材３１を非処理領域全体を覆うように配置する。その場合は、処理領域の位置や形状に応じて、薬液供給ノズル２１の位置や数を調整し、処理領域全体に薬液Ｌが供給されるようにする。そして、処理後の薬液Ｌを非処理領域制御部材３１上を流動させて排出することにより、処理領域が周縁部と連続していなくても、任意の形状の処理領域のみを薬液Ｌによって処理することができる。

【００３５】（第２実施形態）本実施形態では第１実施形態と同一の基板Ｗの上面側の表面処理を例にとり、この処理に用いる表面処理装置及びこの装置を用いた表面処理方法について説明する。図３は本実施形態における表面処理装置の断面図である。図３に示す本実施形態の表面処理装置は、非処理領域制御部材３１にガス供給口４１を設けたところが第１実施形態の表面処理装置と異なるが、その他の構成は同一であることとし、同一な構成についての説明は省略する。

【００３６】本実施形態の表面処理装置におけるガス供給口４１は、例えば、非処理領域制御部材３１の上面から面３１ａに貫通しており、非処理領域制御部材３１の面３１ａと保持部材１１に保持された基板Ｗとの間隙にガスが供給されるように形成されている。ここで、供給したガスを基板Ｗ上の非処理領域Ｂから処理領域Ｃの方向に均等な力で流動させるため、非処理領域制御部材３１の中心により近いところにガス供給口４１を形成する。本実施形態ではガス供給口４１を一箇所に形成した例をとったが、複数個形成してもよい。

【００３７】次に、上記構成の表面処理装置を用いた本実施形態の表面処理方法を説明する。まず、基板Ｗを保持部材１１に保持し、第１実施形態と同様に非処理領域制御部材３１を配置して、保持部材１１と非処理領域制御部材３１とを同速度で回転する。

【００３８】次に、非処理領域制御部材３１に形成されたガス供給口４１から窒素ガスを非処理領域制御部材３１の面３１ａと基板Ｗとの間隙に供給すると、窒素ガスが基板Ｗの非処理領域Ｂから処理領域Ｃの方向に流出される。本実施形態では、供給するガスとして窒素ガスを用いるが、これに限定されるものではなく、空気やアルゴンガス等その他の不活性な気体であってもよい。

【００３９】続いて、薬液供給ノズル２１から処理領域Ｃにおいて回転中心により近いところに薬液Ｌを供給することにより、薬液Ｌを基板Ｗ表面の外周方向へ流動させて、処理領域Ｃの処理を行い、SiO_2膜を除去する。ここで、基板Ｗの処理領域Ｃを流動している薬液Ｌがガス圧で飛散することなく処理領域Ｃ全体に供給されるように、窒素ガスの供給量を調整する。ガスの供給量が多いと、非処理領域制御部材３１の面３１ａと基板Ｗとの間隙から処理領域Ｃ上へガスが勢いよく流出するため、処理領域Ｃ上の薬液Ｌが飛散して処理領域Ｃ全体に供給されない可能性があり、ガスの供給量が少ないと薬液Ｌの非処理領域Ｂへの浸入に対する制御性が低下する。上記処理の後、必要に応じて純水リンスや乾燥処理を行う。

【００４０】上記構成の表面処理装置およびこれを用いた表面処理方法によれば、第１実施形態で説明した構成に加えて、非処理領域制御部材３１の面３１ａと基板Ｗとの間隙に窒素ガスを供給した状態で、基板Ｗの処理領域に薬液Ｌを供給するため、非処理領域Ｂから処理領域Ｃ方向にガスを流出させた状態で処理を行うことが可能であり、非処理領域Ｂへの薬液Ｌの浸入をより確実に防ぐことができる。

【００４１】なお、本実施形態では、非処理領域制御部材３１の面３１ａは薬液Ｌをはじく材料で形成されていることとしたが、本実施形態のように非処理領域制御部

材３１の面３１ａと基板Ｗとの間隙にガスを供給した状態で処理を行う場合は、非処理領域制御部材３１の面３１ａは薬液Ｌをはじく材料で形成しなくても、非処理領域Ｂへの薬液の浸入を制御性よく防ぐことが可能である。この場合は、非処理領域制御部材３１の面３１ａと基板Ｗとの間隔をガスの供給量に対応させて薬液Ｌが浸入しないような間隔に調整する。

【００４２】（第３実施形態）本実施形態では基板Ｗの両面を処理する場合を例にとり、この処理に用いる表面処理装置及びこの装置を用いた表面処理方法について説明する。ここで、表面処理の対象となる基板Ｗの上面側は第１実施形態と同一であり、非処理領域Ｂと処理領域Ｃを有するものとする。一方、基板Ｗの下面側は、上面側と同様にSiO_2膜が全面塗布されており、図５に示したように非処理領域Ｅと処理領域Ｆを有している。基板Ｗ下面側の非処理領域Ｅは基板Ｗの中心部を含む円状部分、処理領域Ｆは非処理領域Ｅ以外の基板Ｗの周縁部とし、両方とも回転対称な領域とする。

【００４３】図４は本実施形態における表面処理装置の断面図である。本実施形態の表面処理装置は基板Ｗをその下面側の中心部で保持する保持部材１３と、保持部材１３に保持された基板Ｗの上面側に対向して配置される非処理領域制御部材３１及び基板Ｗの下面側に対向して配置される非処理領域制御部材３２と、保持部材１３に保持された基板Ｗの周縁部を覆うように配置される薬液供給部材５１を有するものである。

【００４４】保持部材１３は、例えば真空チャックであり、真空溝を有した基板保持面を有している。そして、この真空溝内を減圧することにより、載置した基板を吸着保持させるものである。

【００４５】非処理領域制御部材３１は第１実施形態の表面処理装置と同一のものであることとし、同一な構成についての説明は省略する。

【００４６】また、もう一方の非処理領域制御部材３２は、基板Ｗ下面側の非処理領域Ｅにおいて保持部材１３による保持部分以外の周縁部Ｇと同形状の面３２ｂを有し、この面３２ｂの形状以外の構成は非処理領域制御部材３１と同一であるものとする。非処理領域制御部材３２は保持部材１３で保持された基板Ｗの下面側において、保持部材１３の外周部に配置されている。そして、薬液Ｌをはじく材料で形成された非処理領域制御部材３２の面３２ｂは基板Ｗの非処理領域Ｅの周縁部Ｇに外周形状が合致するように対向して、任意の間隔で配置可能である。

【００４７】一方、薬液供給部材５１は保持部材１３に保持された基板Ｗの上面側及び下面側の周縁部である処理領域Ｃ、Ｆをはさみ込んで処理領域全体を覆うように、基板Ｗに対向して、所定間隔で配置されるものである。ここで、基板Ｗと薬液供給部材５１の間隔は薬液Ｌが浸入するような間隔に形成されていればよい。

【００４８】そして、薬液供給部材５１には基板Ｗ上面との間隙に薬液Ｌを供給するための薬液供給口６１と、基板Ｗ下面との間隙に薬液Ｌを供給するための薬液供給口６２が形成されている。また、薬液供給部材５１には処理後の薬液Ｌを排出するための薬液排出口６３が形成されており、薬液供給口６１、６２から供給された薬液Ｌが、保持部材１３に保持された基板Ｗの処理領域Ｃ、Ｆに対して十分に供給され、流動可能であるように構成されている。

【００４９】薬液供給部材５１の表面は、例えば、SiO_2膜を処理する薬液Ｌに対して濡れ性がよく、薬液Ｌをはじかない材料で形成されるものとする。ここで、薬液Ｌをはじかない材料とは薬液Ｌを滴下した際に接触角が９０度より小さい材料とする。ここでは、薬液供給部材の表面形成材料として、エチレン・ビニルアルコール共重合体を使用するが、これに限定されるものではなく、薬液Ｌをはじかない材料が好ましい。

【００５０】次に、上記構成の表面処理装置を用いた本実施形態の表面処理方法を説明する。まず、基板Ｗを保持部材１３に保持し、非処理領域制御部材３１の３１ａを、第１実施形態で説明したように、基板Ｗ上面の非処理領域Ｂと外周形状が合致するように対向させて、薬液Ｌが浸入しないように予め設定した間隔に調整して配置する。また、非処理領域制御部材３２の面３２ｂも基板Ｗ下面の非処理領域Ｅの周縁部Ｆと外周形状が合致するように対向させて、非処理領域制御部材３１の３１ａと同様に、薬液Ｌが浸入しないように予め設定した間隔に調整して配置する。

【００５１】次に、薬液供給部材５１を基板Ｗの上面及び下面の周縁部である処理領域Ｃ、Ｆをはさみ込んで処理領域全体を覆うように、基板Ｗに対向させて、所定間隔で配置する。

【００５２】続いて、薬液供給口６１、６２から薬液Ｌを供給すると、薬液Ｌは基板Ｗと薬液供給部材５１の間隙に流れ込む。この際、基板Ｗと薬液供給部材５１との間隙が薬液Ｌで満たされるように、十分な量の薬液Ｌを供給する。そして、薬液Ｌを基板Ｗと薬液供給部材５１の間隙内を流動させて、基板Ｗの処理領域Ｃ、Ｆの処理を行い、SiO_2膜を除去する。処理後の薬液Ｌは薬液排出口６３から排出する。上記処理の後、必要に応じて純水リンスや乾燥処理を行う。

【００５３】本実施形態の表面処理装置及びこれを用いた表面処理方法によると、第１実施形態の構成に加えて、薬液Ｌをはじかない材料で形成された薬液供給部材５１が、基板Ｗの処理領域全体を覆うように配置されていることから、薬液Ｌが薬液供給部材５１と基板Ｗとの間隙内ではじかれずに、基板Ｗの処理領域に十分に供給流動される。このため、基板Ｗ両面の処理領域のSiO_2膜を確実に処理することが可能である。

【００５４】なお、本実施形態では基板Ｗを回転させず

に処理を行ったが、回転させて処理を行うことも可能である。なお、この場合、保持部材１３は回転可能な機構を有するものとし、非処理領域制御部材３１、３２及び薬液供給部材５１は保持部材１３と同期して回転可能な機構を有するものとする。

【００５５】また、本実施形態では基板Ｗの処理領域Ｃ、Ｆが周縁部と連続している場合を例にとって説明したが、基板Ｗの処理領域が周縁部と連続していない場合、例えば、基板Ｗの中心部分であったり、基板Ｗの周縁部を含まずに複数箇所に分かれて分布している場合には、処理領域の形状や分布数に対応させて薬液供給部材５１を処理領域全体を覆うように配置する。

【００５６】図６には第３実施形態の変形例を示す。この図に示すように非処理領域制御部材３１にガス供給口４１を形成し、非処理領域制御部材３２にガス供給口４２を形成してもよい。なお、非処理領域制御部材３１に形成されたガス供給口４１は第２実施形態と同一の構成であるものであり、非処理領域制御部材３１の面３１ａと基板Ｗとの間隙にガスを供給するように形成されていることとする。また、ガス供給口４２は、例えば、非処理領域制御部材３２の上面から面３２ｂまで貫通しており、非処理領域制御部材３２の面３２ｂと基板Ｗとの間隙にガスを供給するように形成されている。

【００５７】この表面処理装置を用いて処理を行う場合には、非処理領域制御部材３１、３２、薬液供給部材５１を第３実施形態と同様に配置し、次いで、非処理領域制御部材３１に形成されたガス供給口４１から窒素ガスを非処理領域制御部材３１の面３１ａと基板Ｗとの間隙に供給し、非処理領域制御部材３２に形成されたガス供給口４２から窒素ガスを非処理領域制御部材３２の面３２ｂと基板Ｗとの間隙に供給する。

【００５８】次に、薬液供給口６１、６２から薬液Ｌを供給すると、薬液Ｌは基板Ｗと薬液供給部材５１の間隙に流れ込む。ここで、窒素ガスにより非処理領域制御部材３１、３２と基板Ｗとの間隙内の圧力が高まるように、ガスの供給量を調整する。なお、この際、ガスの供給量を多くすることにより、窒素ガスを薬液供給部材５１と基板Ｗとの間隙に流出させてもよい。

【００５９】薬液供給口６１、６２から供給した薬液Ｌを基板Ｗと薬液供給部材５１の間隙内に流動させて、基板Ｗの処理領域Ｃ、Ｆの処理を行い、SiO_2膜を除去して、処理後の薬液Ｌを薬液排出口６３から排出する。上記処理の後、必要に応じて純水リンスや乾燥処理を行う。

【００６０】上記構成の表面処理装置及びこれを用いた表面処理方法によれば、第３実施形態で説明した構成に加えて、非処理領域制御部材３１の面３１ａ、非処理領域制御部材３１の面３２ｂと基板Ｗとの間隙に窒素ガスが供給されることにより、間隙内の圧力が高まり、薬液Ｌが非処理領域Ｂ、Ｅに浸入するのを制御性よく防ぎ、処理領域Ｃ、ＦのSiO_2膜をより確実に処理することができる。

【００６１】（第４実施形態）本実施形態では第１実施形態と同一の基板Ｗの表面処理を例にとり、この処理に用いる表面処理装置及びこの装置を用いた表面処理方法について説明する。図７は本実施形態の表面処理方法に用いる表面処理装置の断面図である。この図に示す表面処理装置は、基板Ｗを保持するための保持部材１４とこの保持部材１４に保持された基板Ｗに対して所定状態を保って配置される非処理領域制御部材３１とさらにこれらを収納する薬液槽７１とを備えている。

【００６２】保持部材１４は、基板Ｗのエッジを押え込んで基板Ｗを固定するための複数の支持ピン１５を備えたものであり、基板Ｗの処理面である上面側とその下面側とが保持部材１４と接触しないような状態で固定可能に構成されている。

【００６３】非処理領域制御部材３１は第１実施形態の非処理領域制御部材３１と同様に構成されたものである。すなわち、非処理領域制御部材３１における、保持部材１４に保持された基板Ｗに対向する面３１ａは基板Ｗの非処理領域Ｂと同一形状であるとともに、処理に用いる薬液Ｌをはじく材料で形成されているものとする。

【００６４】そして、薬液槽７１は、その内部に予め保持部材１４が収納された状態にあるものとする。ここでは、薬液槽７１内部の底面に対して垂直方向に立設された支持軸１６の上端に、基板Ｗを水平状態で保持できるように保持部材１４が固定されていることとする。また、この薬液槽７１は内部に薬液Ｌを貯留可能であり、ここでの図示を省略した排液管が接続されていることとする。

【００６５】次に、上記構成の表面処理装置を用いた本実施形態の表面処理方法を説明する。まず、基板Ｗを薬液槽７１内に設置された保持部材１４に基板Ｗを保持し、非処理領域制御部材３１の面３１ａを、基板Ｗの非処理領域Ｂと外周形状が合致するように対向させて任意の間隔で配置し、非処理領域制御部材３１を上下方向に可動させることにより、非処理領域制御部材３１の面３１ａと基板Ｗとの間隔を薬液が浸入しないように予め設定された所定間隔に調整する。

【００６６】次に、薬液槽７１に薬液Ｌを注入する。この際、液圧により薬液Ｌが非処理領域制御部材３１の面３１ａと基板Ｗの間隙に浸入しないように、薬液Ｌの液面から基板Ｗの上面までの深さを調整する。注入した薬液Ｌにより、基板Ｗにおける処理領域ＣのSiO_2膜を除去する。上記処理の後、必要に応じて純水リンスや乾燥処理を行う。

【００６７】以上説明したように、上記構成の表面処理装置を用いた表面処理方法であっても、保持部材１４に保持された基板Ｗに対して第１実施形態と同様に配置される同様の構成の非処理領域制御部材３１とを備えてい

るため、基板Ｗに対して非処理領域制御部材３１を薬液が浸入しないように予め設定された所定間隔で配置することで、第１実施形態と同様の処理を行うことが可能である。

【００６８】さらに、薬液槽７１に注入した薬液Ｌに浸漬させて処理を行うことにより、基板Ｗの処理領域Ｃに十分に薬液Ｌを供給して、均一に処理を行うことができる。また、薬液Ｌを繰り返して使用することも可能であるため、コスト的にも優位である。また、基板の下面側を処理することを目的とした場合にも、容易に薬液Ｌを供給することができる。

【００６９】また、本実施形態では予め薬液槽７１内に予め保持部材１４が収納されている状態の表面処理装置について説明したが、非処理領域制御部材３１の面３１ａを保持部材１４に保持された基板Ｗに対して所定間隔に保った状態で、保持部材１４と非処理領域制御部材３１とを上下方向に可動可能な駆動装置を備え、可動させることで薬液槽７１に収納することのできる表面処理装置においては、次のような方法で処理を行う。

【００７０】ここで、基板Ｗの処理前の状態においては、保持部材１４と非処理領域制御部材３１は薬液槽７１の上方に配置されているものとする。まず、基板Ｗを保持部材１４に保持し、非処理領域制御部材３１を本実施形態で説明したように配置する。一方、薬液槽７１には薬液Ｌを貯留する。

【００７１】続いて、保持部材１４に保持された基板Ｗと非処理領域制御部材３１の面３１ａとの所定間隔を保った状態で、保持部材１４と非処理領域制御部材３１を下方向に可動させ、薬液槽７１に貯留された薬液Ｌに浸漬して、基板Ｗの処理を行う。

【００７２】尚、ここでは、駆動装置により保持部材１４と非処理領域制御部材３１を可動させて薬液槽７１に収納されるような機構を有する装置としたが、処理方法としては駆動装置を用いなくてもよく、保持部材１４に保持された基板Ｗと非処理領域制御部材３１の面３１ａとの所定間隔が維持できるのであれば、手動で薬液槽７１に貯留した薬液Ｌに浸漬させてもよい。上記のような表面処理方法によっても、本実施形態と同様の効果を得ることができる。

【００７３】また、本実施形態では半導体基板の周縁部を処理する際の表面処理装置及び表面処理方法について説明したが、これに限定されることなく、非処理領域を含む半導体基板や液晶基板の表面に形成された加工膜の湿式エッチングや、これら基板の表面の湿式洗浄を行う場合にも利用可能である。

【００７４】

【発明の効果】以上説明したように、本発明の請求項１記載の表面処理装置によれば、保持部材に基板が保持された状態において、基板の表面における非処理領域の少なくとも周縁部に、薬液の浸入を抑えるための非処理領域制御部材が対向して配置されることから、基板の表面の非処理領域における薬液の浸入を防ぐことが可能である。より好ましい態様として、非処理領域制御部材の基板に対向する面が薬液をはじく材質である場合には、非処理領域制御部材の基板に対向する面と基板との間隔を、薬液と非処理領域制御部材の面形成材料により予め設定された、薬液が浸入しないような間隔に設定することにより、薬液がはじかれて、基板の表面の非処理領域に対する薬液の浸入を防ぐことができる。したがって、非処理領域制御部材を基板の非処理領域に接触させることなく、非処理領域への薬液の浸入を制御性よく防ぐことが可能である。

【００７５】また、もう一つの好ましい態様として、非処理領域制御部材の基板に対向する面側に貫通したガス供給口が形成されている表面処理装置によれば、保持部材に保持された基板とこれに対して所定間隔で配置される非処理領域制御部材の面との間隙にガスを供給しながら、基板の表面処理を行うことが可能である。このため、基板と非処理領域制御部材の面との間隙においては、非処理領域から処理領域方向にガスが流動することから、非処理領域制御部材を基板の非処理領域に接触させることなく、非処理領域への薬液の浸入を制御性よく防ぐことが可能である。

【００７６】また、本発明の請求項６記載の表面処理方法は、基板の表面における非処理領域の少なくとも周縁部に、薬液の浸入を抑えるための非処理領域制御部材を対向配置した状態で、基板の表面の処理領域に薬液を供給して処理を行うことから、非処理領域における薬液の浸入を防ぎ、処理領域のみを薬液により処理することができる。このような方法により、基板の表面の非処理領域における薬液の浸入に対する制御性が向上することから、処理領域の形状によらずに、例えば、回転非対称な領域のような任意の形状の領域における薬液による処理を確実に行うことが可能となる。このため、例えば、半導体基板の周縁部における不安定な加工膜を回転洗浄で処理するといった場合には、この半導体基板が回転非対称なチップ領域を有していても、このチップ領域に影響を及ぼすことなく、その外周領域をより広い範囲で薬液処理することが可能になり、半導体基板周縁部の加工膜の不安定部分を確実に処理（エッチング除去）することができる。この結果、チップ領域を最大限にとることが可能であり、半導体基板におけるチップの収率を高くすることができるとともに、残存した不安定な状態の加工膜に起因する半導体チップの電気的信頼性の低下等を防ぐことが可能である。

【図面の簡単な説明】

【図１】第１実施形態の表面処理方法に用いる表面処理装置の一例を示す断面図である。

【図２】第１実施形態の表面処理方法に用いる基板の上面側の上面図である。

15

【図３】第２実施形態の表面処理方法に用いる表面処理装置の一例を示す断面図である。

【図４】第３実施形態の表面処理方法に用いる表面処理装置の一例を示す断面図の一部分である。

【図５】第３実施形態の表面処理方法に用いる基板の下面側の上面図である。

【図６】第３実施形態の変形例の表面処理方法に用いる表面処理装置の一例を示す断面図の一部分である。

【図７】第４実施形態の表面処理方法に用いる表面処理装置の一例を示す断面図である。

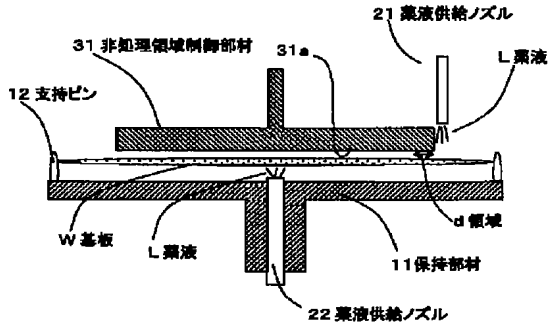
16

＊【図８】従来の技術で説明する半導体基板の上面図である。

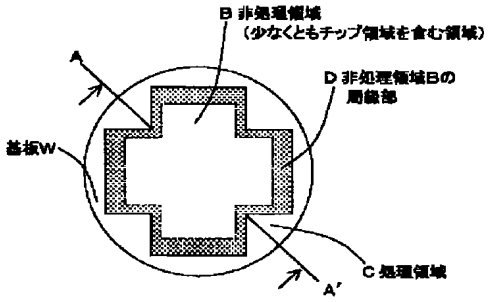
【符号の説明】

１１，１３，１４…保持部材、３１，３２…非処理領域制御部材、３１ａ…非処理領域制御部材３１の面、３２ｂ…非処理領域制御部材３２の面、４１，４２…ガス供給口、５１…薬液供給部材、Ｂ…基板上面側の非処理領域、Ｃ…基板上面側の処理領域、Ｄ…基板上面側の非処理領域の周縁部、Ｅ…基板下面側の非処理領域、Ｆ…基板下面側の処理領域

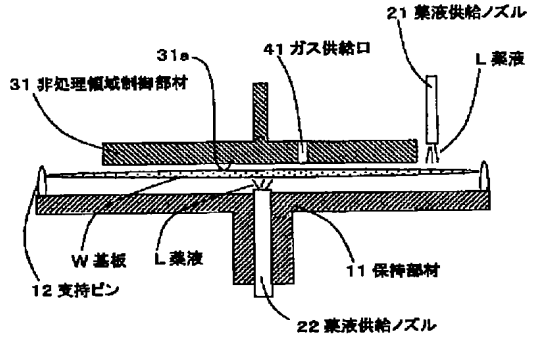
【図１】



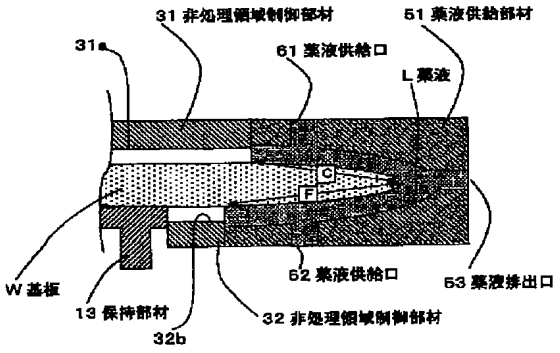
【図２】



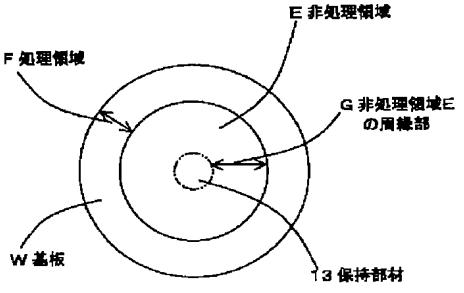
【図３】



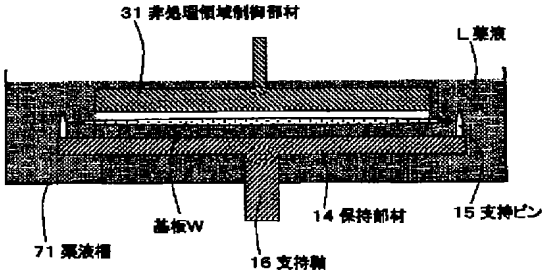
【図４】



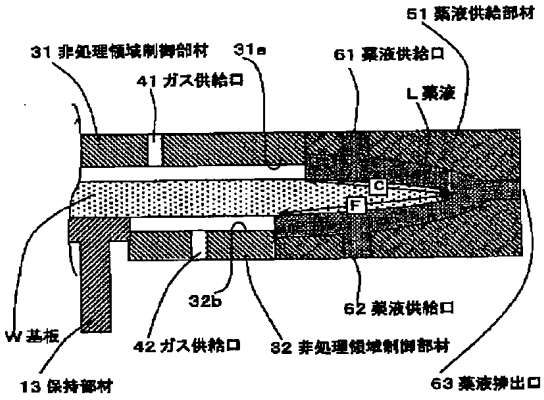
【図５】



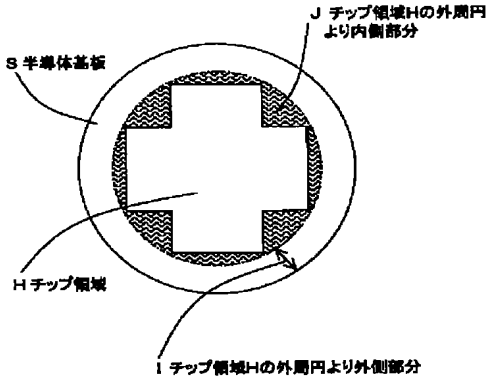
【図７】



【図６】


51 薬液供給部材
31 非処理領域制御部材
31a
61 薬液供給口
41 ガス供給口
L 薬液
C
F
32b
62 薬液供給口
W 基板
42 ガス供給口
32 非処理領域制御部材
13 保持部材
63 薬液排出口

【図８】


J チップ領域Hの外周円より内側部分
S 半導体基板
H チップ領域
I チップ領域Hの外周円より外側部分

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-037097
(43)Date of publication of application : 07.02.2003

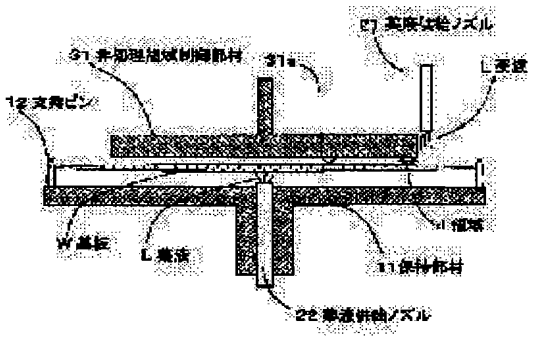
(51)Int.Cl. H01L 21/304
G02F 1/13
G02F 1/1333
H01L 21/306

(21)Application number : 2001-222436
(22)Date of filing : 24.07.2001

(71)Applicant : SONY CORP
(72)Inventor : AISAKA TSUTOMU

(54) APPARATUS AND METHOD FOR SURFACE TREATMENT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an apparatus and a method for surface treatment capable of treating a rotatable asymmetrical region or an arbitrary shape region on the surface of the substrate.
SOLUTION: The apparatus for surface treatment treats the surface of the substrate W with a chemical L. The apparatus comprises a holding member 11 capable of holding the substrate W, and a non-treating region control member 31 for suppressing the invasion of the chemical on a non-treating region B on the surface of the substrate W, in such a manner that the member 31 is disposed oppositely to at least a peripheral edge D of a non-treating region B in a state in which the substrate W is held on the member 11. The method for surface treatment using the apparatus is provided.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] It is surface treatment equipment for processing the front face of a substrate with a drug solution. The attachment component which can hold a substrate, In the condition that consisted of non-processing field control-section material for suppressing permeation of the drug solution in the non-processing field of the front face of said substrate, and said substrate was held at said attachment component Surface treatment equipment with which said non-processing field control-section material is characterized by the thing of said non-processing field which the periphery section is countered at least and arranged.
[Claim 2] The field which counters said substrate of said non-processing field control-section material in surface treatment equipment according to claim 1 is surface treatment equipment characterized by being formed with the quality of the material which crawls said drug solution.
[Claim 3] Surface treatment equipment characterized by forming gas supply opening penetrated to the field side which counters said substrate in surface treatment equipment according to claim 1 at said non-processing field control-section material.
[Claim 4] Surface treatment equipment characterized by said attachment component being pivotable and said non-processing field control-section material being pivotable at this direction and this rotational frequency synchronizing with said attachment component in surface treatment equipment according to claim 1.
[Claim 5] Surface treatment equipment characterized by having the drug solution feed zone material arranged at intervals of predetermined so that the whole processing field of the front face of said substrate may be covered in surface treatment equipment according to claim 1 where said substrate is held at said attachment component.
[Claim 6] It is the surface treatment approach for suppressing permeation of said drug solution in the non-processing field of the front face of said substrate in the surface treatment approach for processing the front face of a substrate with a drug solution. The surface treatment approach characterized by processing by supplying said drug solution to the processing field of the front face of said substrate where [of the non-processing field in the front face of said substrate] opposite arrangement of the non-processing field control-section material is carried out at least at the periphery section.
[Claim 7] The surface treatment approach characterized by processing in the surface treatment approach according to claim 6 by supplying said drug solution to the processing field of the front face of said substrate where gas is supplied to the gap of said non-processing field control-section material and said substrate.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] Especially this invention relates to the surface treatment equipment at the time of performing wet washing and wet etching on the front face of a substrate in production processes, such as a semiconductor device and a liquid crystal display, and the surface treatment approach using this equipment about the surface treatment equipment and the surface treatment approach of a substrate.
[0002]
[Description of the Prior Art] In the production process of a semiconductor device, in [the edge of processing film, such as an insulator layer formed on the semi-conductor substrate and electric conduction film, turning over the periphery section on the front face of a substrate after passing through two or more processes, such as membrane formation, lithography, and dry etching,], it results, is in a very unstable condition and tends to become being as that some of these processing film is breaking away **** with the cause of the source of raising dust. Then, in order to remove such a source of raising dust, surface treatment of a substrate, such as carrying out wet etching removal of the unnecessary processing film in the periphery section of the front face of a substrate, is performed.
[0003] In many cases, surface treatment of such a substrate is performed using the sheet processor of a rotating type. A substrate is held to the attachment component of a sheet processor, the attachment component which held the substrate in the condition of having kept it level is rotated, and, specifically, a drug solution is continuously supplied to a near part by the fixed flow rate by the center of rotation of a processing field from the drug solution supply nozzle arranged above the periphery section on the front face of a substrate (processing field). And making a drug solution flow in the direction of a periphery of a substrate according to a centrifugal force, the substrate front face was processed and etching removal of the processing film of the periphery section was performed.
[0004]
[Problem(s) to be Solved by the Invention] However, by the surface treatment approach of the conventional substrate which was mentioned above, in order to control supply of a drug solution by the centrifugal force, when there was much amount of supply, the drug solution infiltrated also into the non-processing field which exists inside the periphery section of a substrate, and there was a problem that even the processing film of a non-processing field will be processed. Moreover, by this approach, there was a problem that only a symmetrical field could be processed to the center of rotation. for example, it was shown in drawing 8 -- as -- a semi-conductor substrate S front face -- rotation, although the processing film of a lateral part I is processed rather than the periphery circle of the chip field H in order to secure the yield of a chip when it has the unsymmetrical chip field H When the part in the unstable condition of the processing film remained into the inside [circle / of the chip field H / periphery] part J, this unstable part could not fully be removed, but it may have become the cause of the source of raising dust, and the electric dependability of a chip may have been reduced. Moreover, since the processing width of face of the periphery section of a substrate would be expanded when emphasis is put on removal of the unstable part of the processing film, processing will reach the chip field H and there was a problem that the yield of the chip in the semi-conductor substrate S fell.
[0005] in order to solve such a problem, without it makes a drug solution infiltrate into the non-processing field of the front face of a substrate -- rotation -- the surface treatment approach which etching removal of the unnecessary processing film in an unsymmetrical field or the field of the configuration of arbitration is carried out, and can secure the yield of a chip was needed.
[0006] Then, in order to remove the processing film of the field of the configuration of arbitration, the gap formation member which forms a gap to the processing field of the front face of a substrate is prepared, and the approach of supplying processing liquid using capillarity is reported (patent number No. 2902548). However, this approach was not enough as the controllability over permeation of the drug solution in the non-processing field on the front face of a substrate.
[0007] Therefore, offer of the surface treatment equipment which can perform surface treatment, and the surface treatment approach was desired to the processing field of the configuration of the arbitration in the front face of a substrate, without making a drug solution infiltrate into a non-processing field.
[0008]
[Means for Solving the Problem] without it accomplishes this invention in order to solve such a technical problem, and it makes a drug solution infiltrate into the non-processing field in the front face of a substrate -- rotation -- it is related with the surface treatment equipment and the surface treatment approach for processing an

unsymmetrical field and the field of the configuration of arbitration.
[0009] The surface treatment equipment according to claim 1 in this invention consists of an attachment component which can hold a substrate, and non-processing field control-section material for suppressing permeation of the drug solution in the non-processing field of the front face of a substrate, and non-processing field control-section material is characterized by the thing of a non-processing field which the periphery section is countered at least and arranged in the condition that the substrate was held at the attachment component. According to the surface treatment equipment of the above-mentioned configuration, non-processing field control-section material is able to prevent permeation of the drug solution in a non-processing field by [of a non-processing field] countering the periphery section at least and being arranged.
[0010] Moreover, as a desirable mode in the surface treatment equipment mentioned above, the field which counters the substrate of non-processing field control-section material is characterized by being formed with the quality of the material which crawls a drug solution. According to such surface treatment equipment, the periphery section is countered at least and the field formed with the ingredient of the non-processing field in the front face of a substrate which crawls the drug solution of non-processing field control-section material is arranged. For this reason, by setting spacing of the field and substrate which counter the substrate of non-processing field control-section material as spacing into which a drug solution and the drug solution beforehand set up with the field formation ingredient of non-processing field control-section material do not infiltrate, a drug solution is crawled and permeation of the drug solution in the non-processing field of the front face of a substrate can be prevented. Therefore, it is possible to prevent permeation of the drug solution to a non-processing field with a sufficient controllability, without contacting non-processing field control-section material to the non-processing field of a substrate.
[0011] Moreover, another desirable mode in the surface treatment equipment of this invention is that gas supply opening penetrated to the field side which counters the substrate of non-processing field control-section material is formed. According to such surface treatment equipment, gas supply opening is formed in non-processing field control-section material, and it is possible to perform surface treatment of a substrate, supplying gas to a gap with the non-processing field control-section material arranged at intervals of predetermined to the substrate and this which were held at the attachment component. For this reason, in spacing of a substrate and non-processing field control-section material, it is possible to prevent permeation of the drug solution to a non-processing field with a sufficient controllability, without contacting non-processing field control-section material to the non-processing field of a substrate, since gas flows in the direction of a processing field from a non-processing field.
[0012] Moreover, the surface treatment approach of this invention according to claim 6 is the surface treatment approach for suppressing permeation of the drug solution in the non-processing field of the front face of a substrate, at least, is in the condition of the non-processing field in the front face of said substrate which carried out opposite arrangement of the non-processing field control-section material, and is characterized by processing by supplying said drug solution to the processing field of the front face of said substrate at the periphery section.
[0013] rotation since it processes in the periphery section where [of the non-processing field in the front face of a substrate] opposite arrangement of the non-processing field control-section material is carried out, and permeation of the drug solution in a non-processing field can prevent in it and only a processing field can process with a drug solution in it at least by such the surface-treatment approach -- it becomes possible to ensure processing by the drug solution in the field of the configuration of arbitration like an unsymmetrical field.
[0014]
[Embodiment of the Invention] Hereafter, the surface treatment equipment of this invention and the operation gestalt of the surface treatment approach are explained to a detail. The surface treatment equipment and the surface treatment approaches which are explained with this operation gestalt are the surface treatment equipment for processing by supplying a drug solution to the front face of these substrates like [in the case of performing wet washing and wet etching] to the front face of substrates, such as a semi-conductor wafer, and the surface treatment approach using this equipment.
[0015] (The 1st operation gestalt) SiO2 used as the semi-conductor substrate with ** with this operation gestalt The surface treatment in the case of removing a membranous garbage is taken for an example, and the operation gestalt of this invention is explained. rotation of the cross-joint mold with which the substrate W set as the object of surface preparation as shown in drawing 2 includes the core of a substrate -- an unsymmetrical chip field -- having -- **** -- the top-face side of Substrate W -- SiO2 The film is carried out with ******.
[0016] Here, the top-face side of Substrate W shall have the non-processing field B and the processing field C. The non-processing field B is SiO2 certainly on the chip field after surface preparation. Since the film is left behind, it is the field which includes a chip field (illustration abbreviation) at least, and let the periphery configuration of a chip field be the field which carried out round expansion here. the rotation which the processing fields C are parts other than the non-processing field B by the side of a substrate W top face, and is following the periphery section of a substrate on the other hand -- it is an unsymmetrical field. At this operation gestalt, it is SiO2 of the processing field C. The surface treatment equipment used in order to process the film (etching removal), and the surface treatment approach using this equipment are explained.
[0017] Drawing 1 shall be the sectional view of the surface treatment equipment used for the surface treatment approach of the 1st operation gestalt, and shall show the A-A' cross section in drawing 2 about Substrate W. The surface treatment equipment shown in drawing 1 is a sheet processor of a rotating type, and has the non-processing field control-section material 31 equipped with field 31a which counters the top-face side of the drug

solution supply nozzle 21 arranged above the attachment component 11 holding Substrate W, and an attachment component 11, and the substrate W held at the attachment component 11, and is arranged at intervals of arbitration.

[0018] An attachment component 11 is equipped with two or more support pins 12 for holding down the edge of Substrate W and fixing Substrate W, and consists of conditions that its top-face [which is a processing side of Substrate W], and inferior-surface-of-tongue side does not contact an attachment component 11, possible [immobilization]. Moreover, an attachment component 11 is a pivotable spin chuck, where the held substrate W is kept level.
[0019] With this operation gestalt, since the drug solution supply nozzle 21 processes by rotating Substrate W, it is the upper part of the processing field C of Substrate W where the drug solution supplied on Substrate W was held according to the centrifugal force at the attachment component 11, taking flowing in the direction of a periphery of Substrate W into consideration, and is arranged by the center of rotation at a near place. In addition, the drug solution supply nozzle 22 may be arranged also to an attachment component 11 side for the purpose of performing processing by the side of the inferior surface of tongue of Substrate W with the processing field C by the side of the top face in Substrate W.
[0020] Field 31a which counters the substrate W of the non-processing field control-section material 31 is the same configuration as the non-processing field B of Substrate W, and maintaining predetermined spacing to a substrate W front face, this field 31a makes the non-processing field B and periphery configuration of Substrate W which were held at the attachment component 11 agree, and is arranged. What is necessary is just to have the field of the non-processing field B in the substrate W shown in drawing 2 which counters the periphery section D at least and is arranged, although field 31a of the non-processing field control-section material 31 is the same configuration as the non-processing field B and the case where countered the whole non-processing field B and it was arranged was taken for the example with this operation gestalt.
[0021] Field 31a of the non-processing field control-section material 31 shall be formed with the ingredient which crawls the drug solution L which processes for example, SiO2 film. Here, suppose that it is an ingredient with a larger contact angle than 90 degrees when the ingredient which crawls a drug solution L trickles a drug solution L. Here, since a hydrofluoric-acid water solution (HFaq.) is used as a drug solution L, a tetrafluoroethylene polymer can be used as a formation ingredient of field 31a of the non-processing field control-section material 31, but it is not limited to this, and if a tetrafluoroethylene perfluoro alkoxy ethylene copolymer etc. is the ingredient which crawls HFaq., it will not be cared about.
[0022] Moreover, since field 31a of the non-processing field control-section material 31 should just be formed with the quality of the material which crawls a drug solution L, processing which may coat only field 31a with the quality of the material which crawls a drug solution L, and crawls a drug solution L to field 31a may be performed.
[0023] The non-processing field control-section material 31 is still more pivotable at this direction and this rotational frequency synchronizing with an attachment component 11. Moreover, the revolving shaft shall exist on a coaxial line.
[0024] The surface treatment equipment of this operation gestalt Moreover, for example, a measurement means to measure spacing of Substrate W and field 31a of the non-processing field control-section material 31 which were held at the attachment component 11, It is based on spacing measured with the driving means and measurement means for moving the non-processing field control-section material 31 up and down, and spacing set up beforehand. It shall have the control means which controls vertical movement of the non-processing field control-section material 31 by the driving means so that Substrate W and field 31a of the non-processing field control-section material 31 which were held at the attachment component may become spacing by which a setup was carried out [above-mentioned]. If such a measurement means and a control means are established, spacing of the non-processing field control-section material 31 and Substrate W can be adjusted free.
[0025] Next, the surface treatment approach of this operation gestalt using the surface treatment equipment of the above-mentioned configuration is explained. First, hold Substrate W to an attachment component 11, field 31a of the non-processing field control-section material 31 is made to counter so that the non-processing field B and periphery configuration of Substrate W which were held at the attachment component 11 may agree, and field 31a of the non-processing field control-section material 31 and spacing with Substrate W are arranged at intervals of predetermined [which was beforehand set up so that a drug solution L might not permeate]. Spacing with Substrate W in this case, for example, field 31a of the non-processing field control-section material 31, is measured with a measurement means, and the distance to which the non-processing field control-section material 31 is moved is computed by the control means from spacing beforehand set up so that that spacing and drug solution L that were measured might not permeate. Then, movable [of the non-processing field control-section material 31a] is made to carry out in the vertical direction, and field 31a of the non-processing field control-section material 31 and spacing with Substrate W are adjusted to predetermined spacing.
[0026] Here, spacing of field 31a of the non-processing field control-section material 31 and Substrate W which were set up so that a drug solution L might not permeate is experimentally determined by a drug solution L and the formation ingredient of field 31a. However, even if it sets it as predetermined spacing, when a small amount of drug solution L infiltrates into a boundary part (for example, the field d shown in drawing 1) with the processing field C in the non-processing field B, in consideration of the permeation distance from the periphery of the non-processing field control-section material 31, it is necessary to adjust beforehand by carrying out somewhat enlarging the periphery configuration of the non-processing field control-section material 31 etc.

[0027] Next, the non-processing field control-section material 31 and the attachment component 11 holding Substrate W are rotated at this direction and this rotational frequency, and a drug solution L is supplied to a near place by the center of rotation in the processing field C from the drug solution supply nozzle 21. With this operation gestalt, by processing by rotating a substrate, a drug solution L is made to flow in the direction of a periphery of a substrate W front face, the processing field C which followed the periphery section of Substrate W is processed, and SiO2 film is removed.
[0028] Moreover, processing of SiO2 unnecessary film by the side of the inferior surface of tongue of Substrate W can be processed from the drug solution supply nozzle 22 by carrying out supplying a drug solution L in the shape of a shower etc. A pure-water rinse and desiccation processing are performed after the above-mentioned processing if needed.
[0029] By the surface treatment equipment of this operation gestalt, and the surface treatment approach using this, the non-processing field B of Substrate W at least in the periphery section D It is in the condition which carried out opposite arrangement of the field 31a of the non-processing field control-section material 31 formed with the quality of the material which crawls a drug solution L at intervals of predetermined [which was beforehand set up so that a drug solution L might not permeate], and since surface treatment of the substrate W by the drug solution L is performed, it is possible to prevent permeation to the non-processing field B of a drug solution L. And field 31a of the non-processing field control-section material 31 is fabricated by the same configuration as the non-processing field B of Substrate W, and since it processes in the condition of having made the periphery configuration agreeing and having arranged, maintaining predetermined spacing for the non-processing field B of field 31a and Substrate W, it can prevent permeation to the non-processing field B of a drug solution L with a more sufficient controllability.
[0030] moreover, invasion of the drug solution L in the non-processing field of the front face of Substrate W even if it is in the condition made the periphery configuration agree and is rotation washing by processing making it rotate in this direction at this rotational frequency, maintaining predetermined spacing for the non-processing field control-section material 31 and Substrate W of a configuration as mentioned above -- a controllability -- good -- protecting -- rotation -- it is possible to process an unsymmetrical processing field C For this reason, only the unnecessary part of the processing film can be processed (etching removal), and the yield of the chip in Substrate W can also be secured.
[0031] Furthermore, by processing by rotating Substrate W, it can process efficiently, fully supplying a drug solution L and making it flow to the processing field C of Substrate W, and processing speed can be raised.
[0032] When it is the symmetry of revolution, you may make it rotate with rotational speed which does not need to rotate the non-processing field control-section material 31, and is different from the rotational speed of an attachment component 11, although it is necessary to synchronize the non-processing field control-section material 31 with an attachment component 11, and to rotate with this operation gestalt since the non-processing field B is rotation asymmetry. Moreover, processing without rotating Substrate W is also possible, an attachment component 11 may not be a spin chuck, in that case, the drug solution supply nozzle 21 is made into the shape of Myst, or it carries out arranging more than one etc., and a drug solution L is supplied to whole processing field C.
[0033] Although HFaq. was used with this operation gestalt about the drug solution L, if it is the drug solution which can process SiO2 film, it will not be limited to HFaq. Moreover, when the processing film is except SiO2 film, the drug solution L which can process the processing film is used, and the surface tension (contact angle) of a drug solution L determines the formation ingredient of field 31a of the non-processing field control-section material 31.
[0034] Moreover, this operation gestalt explained the case where the processing field of Substrate W was the periphery section of Substrate W. in this case, the non-processing field control-section material 31 can set to the non-processing field of the front face of Substrate W, although what is necessary is to just be arranged at least at the periphery section When the processing field is not following the periphery section of a substrate (for example, when it is a part for the core of a substrate or is divided and distributed over two or more places, without including the periphery section of Substrate W), the non-processing field control-section material 31 is arranged so that the whole non-processing field may be covered. In that case, according to the location and configuration of a processing field, the location and number of the drug solution supply nozzles 21 are adjusted, and a drug solution L is supplied to the whole processing field. And even if the processing field is not following the periphery section by making the non-processing field control-section material 31 top flow, and discharging the drug solution L after processing, only the processing field of the configuration of arbitration can be processed with a drug solution L.
[0035] (The 2nd operation gestalt) With this operation gestalt, the surface treatment by the side of the top face of the same substrate W as the 1st operation gestalt is taken for an example, and the surface treatment equipment used for this processing and the surface treatment approach using this equipment are explained. Drawing 3 is the sectional view of the surface treatment equipment in this operation gestalt. Although the place where the surface treatment equipment of this operation gestalt shown in drawing 3 formed the gas supply opening 41 in the non-processing field control-section material 31 differs from the surface treatment equipment of the 1st operation gestalt, other configurations are made into the same thing and the explanation about the same configuration is omitted.
[0036] It has penetrated from the top face of the non-processing field control-section material 31 to field 31a, and the gas supply opening 41 in the surface treatment equipment of this operation gestalt is formed so that gas may be supplied to field 31a of the non-processing field control-section material 31, and a gap with the substrate W held at the attachment component 11. Here, in order to make the supplied gas flow by the equal force in the direction of

the non-processing field B to the processing field C on Substrate W, the gas supply opening 41 is formed in a near place by the core of the non-processing field control-section material 31. Although the example which formed the gas supply opening 41 in one place was taken with this operation gestalt, more than one may be formed.
[0037] Next, the surface treatment approach of this operation gestalt using the surface treatment equipment of the above-mentioned configuration is explained. First, Substrate W is held to an attachment component 11, the non-processing field control-section material 31 is arranged like the 1st operation gestalt, and an attachment component 11 and the non-processing field control-section material 31 are rotated at this rate.
[0038] Next, if nitrogen gas is supplied to field 31a of the non-processing field control-section material 31, and a gap with Substrate W from the gas supply opening 41 formed in the non-processing field control-section material 31, nitrogen gas will flow out in the direction of the non-processing field B to the processing field C of Substrate W. Although nitrogen gas is used with this operation gestalt as gas to supply, it may not be limited to this and air, argon gas, etc. may be gases with inactive others.
[0039] Then, by supplying a drug solution L to a near place by the center of rotation in the processing field C from the drug solution supply nozzle 21, a drug solution L is made to flow in the direction of a periphery of a substrate W front face, the processing field C is processed, and SiO2 film is removed. Here, without the drug solution L which is flowing the processing field C of Substrate W dispersing with gas pressure, the amount of supply of nitrogen gas is adjusted so that whole processing field C may be supplied. If there is much amount of supply of gas, since gas will flow out of field 31a of the non-processing field control-section material 31, and a gap with Substrate W into up to the processing field C with sufficient vigor, the drug solution L on the processing field C disperses, whole processing field C may not be supplied, and if there is little amount of supply of gas, the controllability over permeation to the non-processing field B of a drug solution L will fall. A pure-water rinse and desiccation processing are performed after the above-mentioned processing if needed.
[0040] According to the surface treatment equipment of the above-mentioned configuration, and the surface treatment approach using this, in the configuration explained with the 1st operation gestalt in addition, where nitrogen gas is supplied to field 31a of the non-processing field control-section material 31, and a gap with Substrate W Since a drug solution L is supplied to the processing field of Substrate W, it is possible to process, where gas is made to flow out of the non-processing field B in the direction of processing field C, and permeation of the drug solution L to the non-processing field B can be prevented more certainly.
[0041] In addition, although [this operation gestalt / field 31a of the non-processing field control-section material 31] formed with the ingredient which crawls a drug solution L Where gas is supplied to field 31a of the non-processing field control-section material 31, and a gap with Substrate W like this operation gestalt, when processing, even if it does not form field 31a of the non-processing field control-section material 31 with the ingredient which crawls a drug solution L, it can prevent permeation of the drug solution to the non-processing field B with a sufficient controllability. In this case, it adjusts to spacing into which field 31a of the non-processing field control-section material 31 and spacing with Substrate W are made equivalent to the amount of supply of gas, and a drug solution L does not infiltrate.
[0042] (The 3rd operation gestalt) With this operation gestalt, the case where both sides of Substrate W are processed is taken for an example, and the surface treatment equipment used for this processing and the surface treatment approach using this equipment are explained. Here, the top-face side of the substrate W set as the object of surface treatment shall be the same as that of the 1st operation gestalt, and shall have the non-processing field B and the processing field C. On the other hand, SiO2 film is completely applied like the top-face side, and the inferior-surface-of-tongue side of Substrate W has the non-processing field E and the processing field F, as shown in drawing 5 . The non-processing field E by the side of a substrate W inferior surface of tongue makes a part for a circular part including the core of Substrate W, and the processing field F the periphery section of substrates W other than the non-processing field E, and both consider as a field symmetrical with rotation.
[0043] Drawing 4 is the sectional view of the surface treatment equipment in this operation gestalt. The attachment component 13 to which the surface treatment equipment of this operation gestalt holds Substrate W in the core by the side of the inferior surface of tongue, It has the non-processing field control-section material 32 which counters the non-processing field control-section material [which counters the top-face side of the substrate W held at the attachment component 13, and is arranged] 31, and inferior-surface-of-tongue side of Substrate W, and is arranged, and the drug solution feed zone material 51 arranged so that the periphery section of the substrate W held at the attachment component 13 may be covered.
[0044] An attachment component 13 is a vacuum chuck and has the substrate maintenance side with a vacuum column. And adsorption maintenance of the laid substrate is carried out by decompressing the inside of this vacuum column.
[0045] The non-processing field control-section material 31 decides to be the same as that of the surface treatment equipment of the 1st operation gestalt, and omits the explanation about the same configuration.
[0046] Moreover, another non-processing field control-section material 32 has field 32b of the shape of the periphery sections G other than the attaching part part by the attachment component 13, and isomorphism in the non-processing field E by the side of a substrate W inferior surface of tongue, and makes the configuration of those other than the configuration of this field 32b the same thing as the non-processing field control-section material 31. The non-processing field control-section material 32 is arranged in the periphery section of an attachment component 13 at the inferior-surface-of-tongue side of the substrate W held by the attachment component 13. And field 32b of the non-processing field control-section material 32 formed with the ingredient which crawls a drug

solution L can counter so that a periphery configuration may agree in the periphery section G of the non-processing field E of Substrate W, and it can be arranged at intervals of arbitration.
[0047] On the other hand, the drug solution feed zone material 51 counters Substrate W, and is arranged at intervals of predetermined so that the processing fields C and F which are the periphery sections by the side of the top face of the substrate W held at the attachment component 13 and an inferior surface of tongue may be inserted and the whole processing field may be covered. Here, spacing of Substrate W and the drug solution feed zone material 51 should just be formed in spacing into which a drug solution L infiltrates.
[0048] And the drug solution feed hopper 61 for supplying a drug solution L to the gap on the top face of substrate W and the drug solution feed hopper 62 for supplying a drug solution L to the gap under substrate W are formed in the drug solution feed zone material 51. Moreover, the drug solution exhaust port 63 for discharging the drug solution L after processing is formed in the drug solution feed zone material 51, and the drug solution L supplied from the drug solution feed hoppers 61 and 62 is fully supplied to the processing fields C and F of the substrate W held at the attachment component 13, and it is constituted so that it can flow.
[0049] The front face of the drug solution feed zone material 51 shall have good wettability to the drug solution L which processes for example, SiO2 film, and it shall be formed with the ingredient which does not crawl a drug solution L. Here, with the ingredient which does not crawl a drug solution L, when a drug solution L is dropped, it considers as an ingredient with a contact angle smaller than 90 degrees. Here, as a surface formation ingredient of drug solution feed zone material, although an ethylene-vinylalcohol copolymer is used, the ingredient which is not limited to this and does not crawl a drug solution L is desirable.
[0050] Next, the surface treatment approach of this operation gestalt using the surface treatment equipment of the above-mentioned configuration is explained. First, Substrate W is held to an attachment component 13, and as the 1st operation gestalt explained, it is made to counter so that the non-processing field B and periphery configuration on the top face of substrate W may agree, and 31a of the non-processing field control-section material 31 is adjusted to spacing beforehand set up so that a drug solution L might not permeate, and is arranged. Moreover, it is made to counter so that the periphery section F and the periphery configuration of the non-processing field E under substrate W may agree, and it adjusts to spacing beforehand set up like 31a of the non-processing field control-section material 31 so that a drug solution L might not permeate, and field 32b of the non-processing field control-section material 32 is also arranged.
[0051] Next, Substrate W is made to counter and it arranges at intervals of predetermined so that the processing fields C and F which are the periphery sections of the top face of Substrate W and an inferior surface of tongue about the drug solution feed zone material 51 may be inserted and the whole processing field may be covered.
[0052] Then, if a drug solution L is supplied from the drug solution feed hoppers 61 and 62, a drug solution L will flow into the gap of Substrate W and the drug solution feed zone material 51. Under the present circumstances, sufficient quantity of the drug solution L is supplied so that the gap of Substrate W and the drug solution feed zone material 51 may be filled with a drug solution L. And the inside of the gap of Substrate W and the drug solution feed zone material 51 is made for a drug solution L to flow, the processing fields C and F of Substrate W are processed, and SiO2 film is removed. The drug solution L after processing is discharged from the drug solution exhaust port 63. A pure-water rinse and desiccation processing are performed after the above-mentioned processing if needed.
[0053] According to the surface treatment equipment of this operation gestalt, and the surface treatment approach using this, since in addition to the configuration of the 1st operation gestalt the drug solution feed zone material 51 formed with the ingredient which does not crawl a drug solution L is arranged so that the whole processing field of Substrate W may be covered, a supply flow of the drug solution L is fully carried out to the processing field of Substrate W, without crawling in the gap of the drug solution feed zone material 51 and Substrate W. For this reason, it is possible to process certainly SiO2 film of the processing field of substrate W both sides.
[0054] In addition, although processed with this operation gestalt, without rotating Substrate W, it is also possible to process by making it rotate. In addition, in this case, an attachment component 13 shall have a pivotable device and the non-processing field control-section material 31 and 32 and the drug solution feed zone material 51 shall have a pivotable device synchronizing with an attachment component 13.
[0055] Moreover, although this operation gestalt explained taking the case of the case where the processing fields C and F of Substrate W are following the periphery section When the processing field of Substrate W is not following the periphery section (for example, when it is a part for the core of Substrate W or is divided and distributed over two or more places, without including the periphery section of Substrate W), it is made to correspond to the configuration and the number of distribution of a processing field, and the drug solution feed zone material 51 is arranged so that the whole processing field may be covered.
[0056] The modification of the 3rd operation gestalt is shown in drawing 6 . As shown in this drawing, the gas supply opening 41 may be formed in the non-processing field control-section material 31, and the gas supply opening 42 may be formed in the non-processing field control-section material 32. In addition, the gas supply opening 41 formed in the non-processing field control-section material 31 is the same configuration as the 2nd operation gestalt, and suppose that it is formed so that gas may be supplied to field 31a of the non-processing field control-section material 31, and a gap with Substrate W. Moreover, it has penetrated from the top face of the non-processing field control-section material 32 to field 32b, and the gas supply opening 42 is formed so that gas may be supplied to field 32b of the non-processing field control-section material 32, and a gap with Substrate W.
[0057] In processing using this surface treatment equipment The non-processing field control-section material 31 and 32 and the drug solution feed zone material 51 are arranged like the 3rd operation gestalt. Subsequently

Nitrogen gas is supplied to field 31a of the non-processing field control-section material 31, and a gap with Substrate W from the gas supply opening 41 formed in the non-processing field control-section material 31. Nitrogen gas is supplied to field 32b of the non-processing field control-section material 32, and a gap with Substrate W from the gas supply opening 42 formed in the non-processing field control-section material 32.
[0058] Next, if a drug solution L is supplied from the drug solution feed hoppers 61 and 62, a drug solution L will flow into the gap of Substrate W and the drug solution feed zone material 51. Here, the amount of supply of gas is adjusted so that the pressure in the gap of the non-processing field control-section material 31 and 32 and Substrate W may increase with nitrogen gas. In addition, nitrogen gas may be made to flow into the gap of the drug solution feed zone material 51 and Substrate W by making [many] the amount of supply of gas in this case.
[0059] The drug solution L supplied from the drug solution feed hoppers 61 and 62 is made to flow in the gap of Substrate W and the drug solution feed zone material 51, the processing fields C and F of Substrate W are processed, SiO2 film is removed, and the drug solution L after processing is discharged from the drug solution exhaust port 63. A pure-water rinse and desiccation processing are performed after the above-mentioned processing if needed.
[0060] According to the surface treatment equipment of the above-mentioned configuration, and the surface treatment approach using this, it adds to the configuration explained with the 3rd operation gestalt. By supplying nitrogen gas to field 31a of the non-processing field control-section material 31, field 32b of the non-processing field control-section material 31, and a gap with Substrate W The pressure in a gap can increase, it can prevent a drug solution L infiltrating into the non-processing fields B and E with a sufficient controllability, and SiO2 film of the processing fields C and F can be processed more certainly.
[0061] (The 4th operation gestalt) With this operation gestalt, the surface treatment of the same substrate W as the 1st operation gestalt is taken for an example, and the surface treatment equipment used for this processing and the surface treatment approach using this equipment are explained. Drawing 7 is the sectional view of the surface treatment equipment used for the surface treatment approach of this operation gestalt. The surface treatment equipment shown in this drawing is equipped with the non-processing field control-section material 31 which maintains a predetermined condition and is arranged to the substrate W held at the attachment component 14 and this attachment component 14 for holding Substrate W, and the drug solution tub 71 which contains these further.
[0062] An attachment component 14 is equipped with two or more support pins 15 for holding down the edge of Substrate W and fixing Substrate W, and consists of conditions that its top-face [which is a processing side of Substrate W], and inferior-surface-of-tongue side does not contact an attachment component 14, possible [immobilization].
[0063] The non-processing field control-section material 31 is constituted like the non-processing field control-section material 31 of the 1st operation gestalt. That is, field 31a in the non-processing field control-section material 31 which counters the substrate W held at the attachment component 14 shall be formed with the ingredient which crawls the drug solution L used for processing while it is the same configuration as the non-processing field B of Substrate W.
[0064] And the drug solution tub 71 shall be in the condition that the attachment component 14 was beforehand contained by the interior. Here, suppose that the attachment component 14 is being fixed to the upper limit of the support shaft 16 perpendicularly set up to the base of the drug solution tub 71 interior so that Substrate W can be held in the level condition. Moreover, this drug solution tub 71 can store a drug solution L in the interior, and suppose that the drainage tube which omitted illustration here is connected.
[0065] Next, the surface treatment approach of this operation gestalt using the surface treatment equipment of the above-mentioned configuration is explained. First, Substrate W is held to the attachment component 14 installed in the drug solution tub 71 in Substrate W. By making field 31a of the non-processing field control-section material 31 counter so that the non-processing field B and periphery configuration of Substrate W may agree, arranging at intervals of arbitration, and making movable [of the non-processing field control-section material 31] carry out in the vertical direction Field 31a of the non-processing field control-section material 31 and spacing with Substrate W are adjusted to predetermined spacing beforehand set up so that a drug solution might not permeate.
[0066] Next, a drug solution L is poured into the drug solution tub 71. Under the present circumstances, the depth from the oil level of a drug solution L to the top face of Substrate W is adjusted so that a drug solution L may not infiltrate into field 31a of the non-processing field control-section material 31, and the gap of Substrate W by fluid pressure. The poured-in drug solution L removes SiO2 film of the processing field C in Substrate W. A pure-water rinse and desiccation processing are performed after the above-mentioned processing if needed.
[0067] Since it has the non-processing field control-section material 31 of the same configuration of being arranged like the 1st operation gestalt to the substrate W held at the attachment component 14 even if it is the surface treatment approach using the surface treatment equipment of the above-mentioned configuration as explained above, It is possible to perform the same processing as the 1st operation gestalt by arranging the non-processing field control-section material 31 to Substrate W at intervals of predetermined [which was beforehand set up so that a drug solution might not permeate].
[0068] Furthermore, by processing by making the drug solution L poured into the drug solution tub 71 immersed, a drug solution L can fully be supplied to the processing field C of Substrate W, and it can process to homogeneity. Moreover, since it is also possible to repeat and use a drug solution L, it is dominance also in cost. Moreover, also when it aims at processing the inferior-surface-of-tongue side of a substrate, a drug solution L can be supplied easily.

[0069] Moreover, although this operation gestalt explained the surface treatment equipment in the condition that the attachment component 14 is beforehand contained in the drug solution tub 71 Where field 31a of the non-processing field control-section material 31 is maintained at predetermined spacing to the substrate W held at the attachment component 14 In the surface treatment equipment which can be contained to the drug solution tub 71 by having a movable possible driving gear in the vertical direction, and making it carry out movable [of an attachment component 14 and the non-processing field control-section material 31], it processes by the following approaches.
[0070] Here, in the condition before processing of Substrate W, an attachment component 14 and the non-processing field control-section material 31 shall be arranged above the drug solution tub 71. First, Substrate W is held to an attachment component 14, and as this operation gestalt explained the non-processing field control-section material 31, it arranges. On the other hand, a drug solution L is stored in the drug solution tub 71.
[0071] Then, where predetermined spacing of Substrate W and field 31a of the non-processing field control-section material 31 which were held at the attachment component 14 is maintained, movable [of an attachment component 14 and the non-processing field control-section material 31] is carried out to down, it is immersed in the drug solution L stored by the drug solution tub 71, and Substrate W is processed.
[0072] In addition, although considered as the equipment which has a device which is made to carry out movable [of an attachment component 14 and the non-processing field control-section material 31] with a driving gear, and is contained by the drug solution tub 71 here It is not necessary to use a driving gear as an art, and as long as predetermined spacing of Substrate W and field 31a of the non-processing field control-section material 31 which were held at the attachment component 14 is maintainable, the drug solution L manually stored in the drug solution tub 71 may be made immersed. Also by the above surface treatment approaches, the same effectiveness as this operation gestalt can be acquired.
[0073] Moreover, although this operation gestalt explained the surface treatment equipment and the surface treatment approach at the time of processing the periphery section of a semi-conductor substrate, also when performing wet etching of the processing film formed in the front face of a semi-conductor substrate including a non-processing field, or a liquid crystal substrate, and wet washing of the front face of these substrates, it is available, without being limited to this.
[0074]
[Effect of the Invention] As explained above, since the non-processing field control-section material for suppressing permeation of a drug solution in the periphery section at least of the non-processing field in the front face of a substrate counters in the condition that the substrate was held at the attachment component according to the surface treatment equipment of this invention according to claim 1 and it is arranged, it is possible to prevent permeation of the drug solution in the non-processing field of the front face of a substrate. When the field which counters the substrate of non-processing field control-section material is the quality of the material which crawls a drug solution as a more desirable mode By setting spacing of the field and substrate which counter the substrate of non-processing field control-section material as spacing into which a drug solution and the drug solution beforehand set up with the field formation ingredient of non-processing field control-section material do not infiltrate, a drug solution is crawled and permeation of a drug solution to the non-processing field of the front face of a substrate can be prevented. Therefore, it is possible to prevent permeation of the drug solution to a non-processing field with a sufficient controllability, without contacting non-processing field control-section material to the non-processing field of a substrate.
[0075] Moreover, according to the surface treatment equipment with which gas supply opening penetrated as another desirable mode to the field side which counters the substrate of non-processing field control-section material is formed, it is possible to perform surface treatment of a substrate, supplying gas to a gap with the field of the non-processing field control-section material arranged at intervals of predetermined to the substrate and this which were held at the attachment component. For this reason, in the gap of a substrate and the field of non-processing field control-section material, it is possible to prevent permeation of the drug solution to a non-processing field with a sufficient controllability, without contacting non-processing field control-section material to the non-processing field of a substrate, since gas flows in the direction of a processing field from a non-processing field.
[0076] Moreover, the surface treatment approach of this invention according to claim 6 is in the condition which carried out opposite arrangement of the non-processing field control-section material for suppressing permeation of a drug solution in the periphery section at least of the non-processing field in the front face of a substrate, since it processes by supplying a drug solution to the processing field of the front face of a substrate, can prevent permeation of the drug solution in a non-processing field, and can process only a processing field with a drug solution. **, for example, the rotation, by the configuration of a processing field since the controllability over permeation of the drug solution in the non-processing field of the front face of a substrate improves by such approach -- it becomes possible to ensure processing by the drug solution in the field of the configuration of arbitration like an unsymmetrical field. for this reason -- the case of for example, a semi-conductor substrate where it is say that the unstable processing film in the periphery section is process by rotation washing -- this semi-conductor substrate -- rotation -- it becomes possible to carry out drug solution processing of that periphery field in the larger range, and the unstable part of the processing film of the semi-conductor substrate periphery section can process certainly, without affect this chip field, even if it has the unsymmetrical chip field (etching removal). Consequently, it is possible to take a chip field to the maximum extent, and while being able to make high yield of

the chip in a semi-conductor substrate, it is possible to prevent the fall of the electric dependability of the semiconductor chip resulting from the processing film in the unstable condition of having remained etc.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view showing an example of the surface treatment equipment used for the surface treatment approach of the 1st operation gestalt.
[Drawing 2] It is a plan by the side of the top face of the substrate used for the surface treatment approach of the 1st operation gestalt.
[Drawing 3] It is the sectional view showing an example of the surface treatment equipment used for the surface treatment approach of the 2nd operation gestalt.
[Drawing 4] They are some sectional views showing an example of the surface treatment equipment used for the surface treatment approach of the 3rd operation gestalt.
[Drawing 5] It is a plan by the side of the inferior surface of tongue of the substrate used for the surface treatment approach of the 3rd operation gestalt.
[Drawing 6] They are some sectional views showing an example of the surface treatment equipment used for the surface treatment approach of the modification of the 3rd operation gestalt.
[Drawing 7] It is the sectional view showing an example of the surface treatment equipment used for the surface treatment approach of the 4th operation gestalt.
[Drawing 8] It is the plan of the semi-conductor substrate explained by the Prior art.
[Description of Notations]
11, 13, 14 -- 31 An attachment component, 32 -- Non-processing field control-section material, 31a -- The field of the non-processing field control-section material 31, 32b [-- The non-processing field by the side of a substrate top face, C / -- The processing field by the side of a substrate top face, D / -- The periphery section of the non-processing field by the side of a substrate top face E / -- The non-processing field by the side of a substrate inferior surface of tongue, F / -- Processing field by the side of a substrate inferior surface of tongue] -- 41 The field of the non-processing field control-section material 32, 42 -- Gas supply opening, 51 -- Drug solution feed zone material, B

[Translation done.]